

【CLAIMS】

【Claim 1】 A gas control valve comprising:

a hollow valve case including a gas intake port formed at the upper side thereof, a gas discharge port formed at the side thereof, an upper inclined end having
5 a narrow upper side and a wide lower side, and a protruded intermediate side;

a valve piston, inserted into the valve case to move upward and downward, with which an O-ring for sealing the space between the valve case and the valve piston is coupled;

10 a compression spring inserted into the space between the valve piston and the protruded intermediate side to apply a force to push the valve piston down; and

a heat exchanger, installed on the bottom of the valve case, for increasing vapor pressure to apply a force to the valve piston to be pushed upward such that the gas control valve automatically adjusts the quantity of gas in response to the heat transferred to the heat exchanger.

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【Claim 2】 A gas blocking valve comprising:

a hollow valve case including a gas discharge port formed at the side thereof, a gas intake port formed below the gas discharge port, and a protruded intermediate side;

20 a valve piston, inserted into the valve case to move upward and downward, with which an O-ring for sealing the space between the valve case and the valve piston is coupled;

a compression spring inserted into the space between the valve piston and the protruded intermediate side to apply a force to push the valve piston down; and

25 a heat exchanger, installed on the bottom of the valve case, for increasing vapor pressure to apply a force to the valve piston to be pushed upward such that the gas blocking valve automatically blocks gas in response to the heat transferred to the heat exchanger.

30 **【Claim 3】** An automatic warm water circulator using gas valves,

comprising:

a circulation cycle formed such that a reservoir is connected to a boiler by a supply pipe, the boiler is connected to a heat exchanger by a discharge pipe, and the reservoir is connected to the heat exchanger by a circulation pipe;

5 a hollow combustion chamber provided in the lower side of the boiler and having both sides protruded toward the outside of the boiler;

a gas supply and ignition device for supplying the gas to the inside of the combustion chamber and for burning the gas to heat water in the boiler; and

10 a supply valve and a discharge valve respectively provided in the supply pipe and the discharge pipe and automatically opened and closed in response to the inner pressure of the boiler.

【Claim 4】 The automatic warm water circulator using gas valves as set forth in claim 3, wherein the gas supply and ignition device comprises:

15 a main nozzle provided in the combustion chamber and connected to a gas container by a main gas pipe to eject the supplied gas;

a pilot igniter for igniting the gas ejected from the main nozzle; and

20 a gas control valve, provided in the main gas pipe, for automatically controlling the quantity of the gas to be supplied to the main nozzle according to the temperature of the boiler.

【Claim 5】 The automatic warm water circulator using gas valves as set forth in claim 4, further comprising:

25 a gas blocking valve, installed in the main gas pipe to be connected to the gas control valve in serial, for automatically blocking the gas to be supplied to the main nozzle according to the temperature of the boiler.

【Claim 6】 The automatic warm water circulator using gas valves as set forth in claim 3, wherein the combustion chamber includes:

30 protruded ends formed in the upper outer circumference thereof; and
air intake ports, coupled with both end of the combustion chamber,

through which air necessary for combustion of the gas is introduced.

【Claim 7】 The automatic warm water circulator using gas valves as set forth in claim 4, wherein the pilot igniter comprises:

- 5 a pilot nozzle connected to a pilot supply pipe branched from the main gas pipe and installed near to the main nozzle, and including a pilot lighter connected to a pilot switch such that the pilot nozzle ignites the gas ejected from the main nozzle while the pilot nozzle flames.

- 10 **【Claim 8】** The automatic warm water circulator using gas valves as set forth in any one of claims 3 to 7, wherein the reservoir comprises:

an opening for opening a part of the upper side of the reservoir;

an opening and closing device provided at the opening and having a ventilation hole; and

- 15 an air pack, installed in the opening and closing device, for sealing the opening and being contracted and expanded due to the pressure difference between the inner pressure of the reservoir and an external pressure by the opening.

- 【Claim 9】** The automatic warm water circulator using gas valves as set forth in claim 8, wherein the air pack is provided in the upper or lower surface of the opening and closing device.
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- 【Claim 10】** The automatic warm water circulator using gas valves as set forth in claim 8, wherein the air pack accommodates water.
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